

Air Quality Baseline Technical
Report (AECOM)

Silfield Garden Village

Air Quality Baseline Technical Report

March 2020

Quality information

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1. Executive Summary

A qualitative review of local air quality has been conducted to support the Regulation 18 submission for plans for the development opportunity in Silfield Garden Village. This review has identified that levels of air quality in the local area are generally good and there are no Air Quality Management Areas within South Norfolk District Council and no measured exceedances of the UK air quality strategy objectives.

No major constraints were identified as part of the review. However, during construction, it is advised that best practice mitigation measures are put in place to minimise any potential impacts and that construction vehicles use the strategic road network to access the site, rather than local roads. During occupation of the site, there is also the potential for increased exposure at residential properties located close to the A11. The current masterplan is for residential properties to be built alongside the A11 behind trees at a distance of around 30m-40m which is likely to be acceptable.

A detailed air quality assessment should be submitted to support future planning application(s) for these properties. Subject to further modelling to take into account details such as height of receptors in relation to the road, local traffic flows, emission from energy centres, etc, mitigation measures may be required to ensure concentrations of pollutants achieve acceptable levels

2. Introduction

- 2.1 Orbit Homes are leading the promotion of a major new residential led, mixed use, strategic garden village development on land at Silfield in Norfolk, with a view for it to be included in the Greater Norwich Local Plan (GNLP). Orbit Homes are working with others including Bowbridge Strategic Land to promote the site for this use.
- 2.2 The purpose of this review is to provide advice on air quality to support the work conducted for the Regulation 18 consultation response for Silfield Garden Village.
- 2.3 A desk-based appraisal has been conducted to identify the current air quality environment within a defined study area around Silfield Garden Village based on the following sources of information and existing data;
 - Background air pollution concentrations of nitrogen dioxide (NO₂) and fine particulates (PM₁₀) from Department for Environment, Food and Rural Affairs (Defra);
 - Air quality monitoring data from South Norfolk Council and Defra;
 - Natural England data on designated international, national and local ecological sites;
 - Google mapping information on sensitive receptors such as residential properties, schools and hospitals; and
 - Local air pollution sources and cumulative impacts from other development sites as well as from industrial sites from Council planning information and website.
- 2.4 Based on this information, a summary of the key constraints and opportunities to air quality has been provided and recommendations given for any mitigation measures that may be considered as part of the development of the garden village.

3. Policy

National Air Quality Strategy

- 3.1 The UK National Air Quality Strategy (AQS) was initially published in 2000, under the requirements of the Environment Act 1995¹. The most recent revision of the Strategy² sets objective values to help Local Authorities manage local air quality improvements in accordance with the EU Air Quality Framework Directive.
- 3.2 The air quality objective values have been set down in regulation for the purposes of local air quality management (LAQM). Under the LAQM regime, local authorities have a duty to carry out regular assessments of air quality against the objective values and if it is unlikely that the objective values will be met in the given timescale, they must designate an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objective values. The boundary of an AQMA is set by the local authority to define the geographical area that is to be subject to the management measures to be set out in a subsequent action plan. It is not unusual for the boundary of an AQMA to include within it, relevant locations where air quality is not at risk of exceeding an air quality objective.
- 3.3 The UK’s national air quality objective values for the pollutants of relevance to this assessment are displayed in Table 1.

Table 1 Key National Air Quality Strategy Objective

| Pollutant | Averaging Period | Value | Maximum Permitted Exceedances | Target Date |
|--|------------------|-----------------------|-------------------------------|-------------|
| Nitrogen Dioxide (NO ₂) | Annual Mean | 40 µg/m ³ | None | 31/12/2005 |
| | Hourly Mean | 200 µg/m ³ | 18 times per year | 31/12/2005 |
| Particulate Matter (PM ₁₀) | Annual Mean | 40 µg/m ³ | None | 31/12/2004 |
| | 24-hour | 50 µg/m ³ | 35 times per year | 31/12/2004 |
| Fine Particulate Matter (PM _{2.5}) | Annual Mean | 25 µg/m ³ | None | 2020 |

- 3.4 The principal air quality legislation within the United Kingdom is the Air Quality Standards Regulations (as amended 2016)³ which transposes relevant EU Air Quality Directives into national legislation.

Clean Air Strategy

- 3.5 In 2019, the UK government released its Clean Air Strategy 2019⁴, part of its 25 Year Environment Plan. The Strategy places greater emphasis on improving air quality in the UK than has been seen before and outlines how it aims to achieve this (including the scheme of new enabling legislation).
- 3.6 Air quality management focus in recent years has primarily related to one pollutant, NO₂, and its principal source in the UK, road traffic. However, the 2019 Strategy broadens the focus to other areas, including domestic emissions from wood burning stoves and from agriculture. This shift in emphasis is

¹ H.M. Government (1995). The Environment Act.

² Department for Environment Food and Rural Affairs (Defra) (2007), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

³ H.M. Government (2015), The Air Quality Standards Regulations. SI 1001, The Stationery Office.

⁴ Department for Environment Food and Rural Affairs (Defra) (2019), Clean Air Strategy.

part of a goal to reduce the levels of fine particulate matter (PM_{2.5}) in the air to below the World Health Organisation guideline level; far lower than the current objective.

National Planning Policy Framework

3.7 The revised National Planning Policy Framework (NPPF) was published in February 2019 which sets out the Government's planning policies for England and how these are expected to be applied⁵. This NPPF supersedes the previous NPPF published in March 2012. Policies and objectives which are of particular relevance to local air quality and noise are summarised below:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health."

3.8 Air quality and noise are considered as an important element of the natural environment. On conserving and enhancing the natural environment, Paragraph 170 states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: ...

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality ..."

3.9 Air quality in the UK has been managed through the Local Air Quality Management regime using national objectives. Paragraph 181 of the NPPF states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. ... Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

Planning Practice Guidance (PPG)⁶

3.10 The PPG was updated on 24th July 2018 with specific reference to air quality to support the NPPF. The PPG states that the planning system should consider the potential effect of new developments on air quality where relevant limits have been exceeded or are near the limit.

3.11 When deciding whether air quality is relevant to a planning application the PPG states that a number of factors should be taken into consideration including if the development will:

- *"Significantly affect traffic in the immediate vicinity of the Site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- *Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations; and/or*

⁵ Ministry of Housing, Communities & Local Government (2019), National Planning Policy Framework, the National Archives.

⁶ Ministry of Housing, Communities and Local Government (2018), Planning Practice Guidance (PPG).

- *Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the Site, or does it otherwise affect biodiversity, particularly designated wildlife sites.”*

3.12 The PPG provides a summary of the air quality issues set out in the National Planning Policy Framework and goes on to note that an air quality assessment in support of a proposed development should include the following information:

- The existing air quality in the study area (existing baseline);
- The future air quality without the development in place (future baseline); and
- The future air quality with the development in place (with mitigation).

South Norfolk Local Plan - Development Management Policies Document (DMPD)

3.13 The DMPD⁷ includes the following policy DM 3.14 Pollution, health and safety which states

“a) All development should minimise and where possible reduce the adverse impact of all forms of emissions and other forms of pollution, and ensure that there is no deterioration in water quality or water courses.

b) When assessed individually or cumulatively, development proposals should ensure that there will be no unacceptable impacts on:

i. Air quality

ii. Surface and ground water quality

iii. Land quality and condition

iv. Health and safety of the public

...d) Developments which may impact on air quality will not be permitted where they have an unacceptable impact on human health, sensitive designated species or habitats, and general amenity, unless adequate mitigation can be ensured. Development will not be granted in locations where it is likely to result in an Air Quality Management Area being designated or the worsening of air quality in an existing Air Quality Management Area...”

Joint Core Strategy for Broadland, Norwich and South Norfolk

3.14 The Joint Core Strategy (JCS)⁸ sets out the long-term vision and objectives for the area, including strategic policies for steering and shaping development. Whilst it does not specifically mention air quality, Policy 1: Addressing climate change and protecting environmental assets, notes that;

“The environmental assets of the area will be protected, maintained, restored and enhanced and the benefits for residents and visitors improved.

Development and investment will seek to expand and link valuable open space and areas of biodiversity importance to create green networks. Where there is no conflict with biodiversity objectives, the quiet enjoyment and use of the natural environment will be encouraged and all proposals should seek to increase public access to the countryside”.

⁷ South Norfolk Local Plan DMPD Adopted October 2015

⁸ JCS for Broadland, Norwich and South Norfolk. Adopted March 2011, amendments adopted January 2014. Greater Norwich Development Partnership.

4. Study Area

- 4.1 The proposed Site for Silfield Garden Village is wholly within South Norfolk District Council. It covers 451 hectares of agricultural land and is located 2km south of Wymondham in South Norfolk and 15km south-west of Norwich. The A11 (Wymondham Bypass), which forms part of the Highways England's strategic road network connecting the A14 and M11, divides the land in two and will provide the main access to the site.
- 4.2 The masterplan may provide up to 6,500 dwellings, 250,000 square feet of commercial employment as well as one secondary and up to three new primary schools.
- 4.3 This review focuses on a study area of approximately 1km from the Site Boundary as illustrated in Figure 1.

5. Baseline Conditions

Air Quality Management Areas (AQMAs)

5.1 There are no AQMAs declared in South Norfolk District Council.

Air Quality Monitoring Data

5.2 Under the LAQM regime, South Norfolk District Council monitored NO₂ at 28 diffusion tube sites in 2018. Concentrations at all sites have generally declined over the last few years and are well below the AQS annual mean objective of 40µg/m³ at all sites. The local authority does not currently measure particulates.

5.3 Recent annual mean NO₂ concentrations measured at the monitoring locations nearest the Site over the last five years has been taken from the local authority’s most recent annual status report⁹ and are given in Table 2. The location of these sites is given in Figure 1.

5.4 There are also monitoring sites approximately 9km further along the A11 to the north-east. concentrations at these sites are well below the objective.

5.5 There are no Defra monitoring sites located near the Site.

Table 2 Recent Annual Mean NO₂ Concentrations in the Study Area

| Site Details (distance from site) | Annual mean NO ₂ concentration (µg/m ³) | | | | |
|---|--|------|------|------|------|
| | 2014 | 2015 | 2016 | 2017 | 2018 |
| DT8 Fairland Street, Wymondham (500m north) | 23.4 | 18.4 | 23.3 | 22.0 | 20.5 |
| DT12 Rightup Lane (within site boundary) | 21.4 | 16.3 | 21.9 | 21.2 | 19.7 |
| DT10 Norwich Road, Wymondham (2km north) | 16.7 | 12.0 | 18.0 | 16.5 | 15.3 |
| DT13 Norwich Road, Wymondham (2km north) | 14.2 | 11.9 | 15.9 | 16.1 | 15.0 |
| DT14 Norwich Road, Wymondham (2km north) | 18.1 | 13.3 | 17.0 | 16.2 | 15.1 |
| AQS Objective | 40 | | | | |

Background Pollutant Concentrations

5.6 Annual average background pollutant concentration estimates for NO₂ and PM₁₀ have been sourced from Defra’s 2017 based background maps¹⁰ for the current year 2020 for the study area around the Site.

5.7 The study area falls into 12 different 1 km grid squares each of which has different background pollution concentrations. The 2020 concentrations are given in Table 3 and illustrated in Figure 2 and Figure 3 for

⁹ https://www.south-norfolk.gov.uk/sites/default/files/downloads/asr_template_england_2019_0.pdf

¹⁰ <https://uk-air.defra.gov.uk/data/laqm-background-home>

NO₂ and PM₁₀ respectively. Concentrations of both pollutants are well below the AQS objective of 40 µg/m³ as an annual mean across the study area.

Table 3 Mapped Background Concentrations (2020)

| Year | Easting (m) | Northing (m) | Annual Mean Background Concentration (µg/m ³) | |
|------|-------------|--------------|---|------------------|
| | | | NO ₂ | PM ₁₀ |
| 2020 | 611500 | 301500 | 11.1 | 14.0 |
| 2020 | 611500 | 300500 | 9.2 | 14.4 |
| 2020 | 610500 | 300500 | 9.0 | 15.0 |
| 2020 | 610500 | 299500 | 9.8 | 15.6 |
| 2020 | 611500 | 299500 | 10.4 | 15.9 |
| 2020 | 612500 | 299500 | 8.6 | 14.7 |
| 2020 | 610500 | 298500 | 9.7 | 15.7 |
| 2020 | 611500 | 298500 | 8.3 | 15.4 |
| 2020 | 612500 | 298500 | 8.1 | 15.3 |
| 2020 | 610500 | 297500 | 8.1 | 15.1 |
| 2020 | 611500 | 297500 | 7.9 | 14.7 |
| 2020 | 612500 | 297500 | 7.8 | 14.8 |

Air Pollution Sources

- 5.8 The main source of emissions within the wider study area is from road vehicles on the A11 (Wyndham Bypass) which is within the site boundary. There is a potential risk of exposure to elevated concentrations of NO₂ and PM₁₀ pollutants at properties within 200m of the road if no mitigation is in place.
- 5.9 There will also be new emissions to air associated with construction and operation of the sites, with residential properties located up to 350m beyond the site boundary being potentially susceptible to amenity and health impacts from dust and road traffic emissions generated during construction. This would be appropriately mitigated through a Construction Environment Management Plan (CEMP) as part of an outline application.
- 5.10 Based on information from South Norfolk Council’s website, there are no industrial sources which may have a potential impact on air quality within 1km of the study area. There local area is largely agricultural land but there have been no recent complaints from farming practices such as poultry farms in recent years.

Sensitive Receptors

5.11 The main types of receptors for local air quality that are considered include:

- Nationally and internationally designated ecological sites such as Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SAC), Special Protection Areas (SPA) and sites listed under the Convention on Wetlands and Wildfowl (Ramsar); and
- Public Exposure Receptors – sensitive locations where relevant exposure for the air quality criteria being assessed could occur e.g. residential properties or schools (as defined in Defra’s Local Air Quality Management technical guidance; LAQM.TG16¹¹). Additional receptors may be sensitive to deposition of dust and dust soiling (e.g. parks, gardens and allotments) during the construction phase.

5.12 There is only one designated ecological receptor located within approximately 1km of the Site boundary at Lower Wood, Ashwellthorpe SSSI to the south east (see Figure 1). There are other SACs and SSSIs, in the District, but these are more than 5km away.

5.13 There are number of receptors that are sensitive to dust in the immediate vicinity of the Site. These include residential and commercial properties, and farmhouses located within 200 m of the Site and those located in the close proximity to the construction routes. There are also many residential properties and schools located to the north of the site in Wymondham which may be affected by operational impacts from increased traffic associated with the site. Figure 1 indicates the locations of selected receptors as an example of potential areas of concern.

5.14 Once the site is built, there may also be operational impacts from road traffic and energy centre emissions from buildings within the site at new proposed receptors.

5.15 The impacts of air quality on receptors would need to be considered as part of the submitted planning applications.

Cumulative Impacts

5.16 There are a number of planning applications that have been submitted to the local authority in the area including land to the south and east of Rightup Lane (Endurance Site) and the Pelham site east of Silfield Road and north of the A11, both in Wymondham. The potential short- and long-term cumulative impacts of these developments during construction and operation should be considered as part of the planning applications.

¹¹ <https://laqm.defra.gov.uk/technical-guidance/>

6. Constraints

Construction Phase

- 6.1 The site clearance works, construction activities and additional vehicle movements associated with the new developments have a potential to generate an emission of airborne particulate matter and NO₂ concentrations. A consideration should be given to a potential health impact on local sensitive receptors located in the local proximity to or within the Site, as well as those locations alongside the road network used by the construction vehicles. It is advised that construction vehicles should use the strategic road network to access the site, i.e. the A11 or Silfield Road rather than local roads.
- 6.2 As part of the submission of any planning applications, best practice mitigation measures should be put in place to minimise any potential impacts, for example by committing to a CEMP.

Operational Phase

- 6.3 During operation, there are potential to change vehicle movements on the A11 and local surrounding road network. An increase in vehicle emissions can increase the exposure at sensitive receptors to concentrations of the key pollutants, NO₂ and particulate matter (both PM₁₀ and PM_{2.5}). Based on measured concentrations on Newmarket Road further along the A11 towards Norwich, it is recommended that the masterplan design does not incorporate any new residential properties within 20m of the A11. The current masterplan is for residential properties to be built alongside the A11 behind trees at a distance of around 30m-40m which is considered acceptable in terms of potential pollutant concentrations at this distance.
- 6.4 Further modelling and additional information on concentrations, height of receptors in relation to the road, local traffic flows etc should be conducted as part of a site suitability assessment to support an outline planning application. This would also help determine any necessary mitigation if required.
- 6.5 Depending on the planned energy strategy, the Proposed Development might include a number of energy centres, which have the potential to affect the local sensitive receptors.
- 6.6 Consideration should be given to the potential long-term operational impacts on existing and proposed receptors and any mitigation that may be needed to minimise impacts.

7. Opportunities

7.1 There are a number of opportunities to minimise the contribution that the development makes on emissions to the air. These could include the following;

- Promoting the scheme as NetZero which would have a positive impact on emissions;
- Planning extensive woodland to offset any impacts;
- Supporting a mix of land uses including facilities and services and would be self-contained thereby reducing the need to travel and minimising the number of vehicle trips;
- Creating and implement a green transport plan to encourage sustainable modes of transport including;
 - New bus services and routes including connection of First Network Norwich or Green Line Norwich to the site and bus hub on the site;
 - Improved connectivity and services at local rail stations (Spooner Row, Wymondham) and opportunities for further connection of existing tracks;
 - Provision of electric charging units on sites and car sharing facilities; and
 - Pedestrian and cycle routes towards Wymondham and links to the Norwich Pedalways network.
- Minimising impacts from emissions from energy centre(s) on the site, there is the potential to design a site-wide energy strategy that utilises modern technology to reduce emissions and optimise plant performance.

8. Conclusions

- 8.1 Air quality in the local area of the Site is good. There are no declared AQMAs in the District and pollutant concentrations at monitoring sites within South Norfolk District Council are all below the relevant AQS objectives.
- 8.2 Overall, whilst the review has identified some potential air quality constraints associated with construction impacts and exposure close to the A11, it has not identified anything that is likely to have a major effect on the evolution of the masterplan proposals.
- 8.3 However, due to the size of the Proposed Development, there may be the potential to affect local ambient air quality from increases in emissions associated with construction and operation as outlined above. It is therefore recommended that mitigation measures should be incorporated into the design of the proposed developments. This could include (but are not limited to), the following:
- Locating residential areas and other air quality sensitive areas away from existing or proposed sources of air pollution, including the A11 and energy generation;
 - The consideration of measures for inclusion within a green travel plan to reduce road traffic emissions associated with the construction and operation of the proposed development.
- 8.4 In addition, to support a submission of the planning application(s), it is recommended that an Air Quality Impact Assessment should be carried out to consider the following potential effects:
- Fugitive emissions of particulate matter from construction phase activities;
 - Traffic emissions associated with the construction phase;
 - Emissions from road vehicles during the operational phase;
 - Emissions from energy centre plant (if applicable) during the operational phase;
 - Combined emissions from road traffic and energy centre; and
 - Cumulative impacts.
- 8.5 It is recommended that the Air Quality Impact Assessment will include:
- The identification of baseline air quality conditions and nearby sensitive receptors;
 - The need for any monitoring at locations close to the A11 and within the site boundary (recommended period of 3-6 months minimum);
 - Consideration of any demolition and construction phase impacts on dust impacts;
 - Modelling of road traffic emissions (NO₂, PM₁₀ PM_{2.5}) using the ADMS Roads model;
 - Modelling of the heating plant related emissions using the ADMS 5 model (if required);
 - Site suitability assessment; and
 - If required a calculation of potential cost of emission mitigations.

Appendix A Figures

Figure 1 Site Boundary (Core Site) with Air Quality Monitoring Sites and Selected Receptors

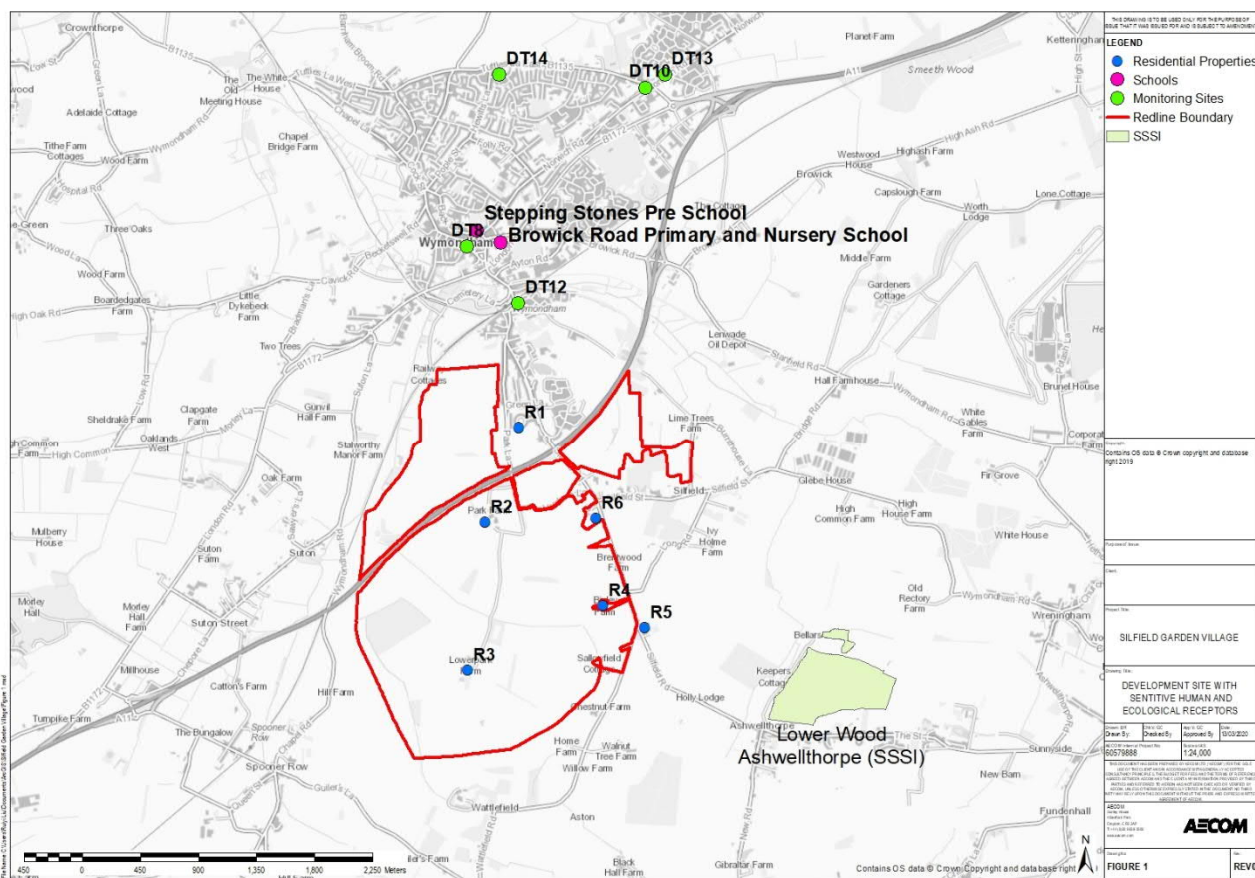


Figure 2 Mapped Background NO₂ Concentrations

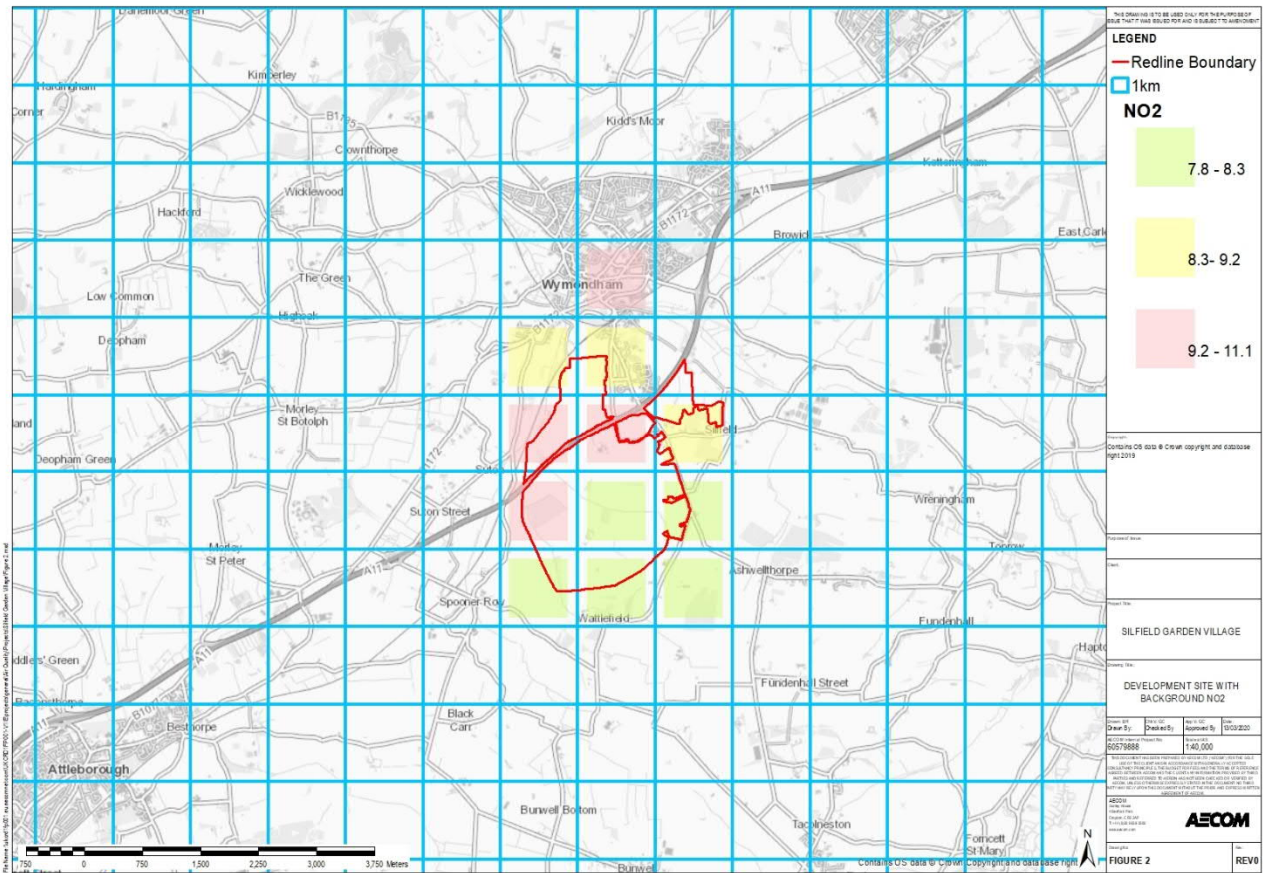


Figure 3 Mapped Background PM₁₀ Concentrations

